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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,437	03/26/2004	Hongyu Yue	250638US6 YA	8105

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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.		
1940 DUKE STREET		
ALEXANDRIA, VA 22314		

EXAMINER	
ANYA, IGWE U	

ART UNIT	PAPER NUMBER
2891	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary	Application No. 10/809,437	Applicant(s) YUE ET AL.	
	Examiner IGWE U. ANYA	Art Unit 2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-18 is/are pending in the application.
4a) Of the above claim(s) 13-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 2891

4. Claims 1 – 4 and 6 – 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Angell et al. (US 5,658,423) in view of Odagiri et al. (US 2002/0067493).

5. Angell et al. teach a method of monitoring a processing system for processing a substrate during the course of semiconductor manufacturing comprising:

acquiring data from said processing system for a plurality of observations, said data comprising a plurality of data variables (fig. 2A element 10, col. 5 lines 45 – 49);

determining one or more principal components of said data for said plurality of observations using principal components analysis (fig. 2A element 20);

acquiring additional data from said processing system (fig. 2B element 60, col. 7 lines 15 – 20);

determining at least one statistical quantity (fig. 2B element 90) from one or more scores calculated from a projection of said additional data onto said one or more principal components (fig. 2B elements 70 – 80, col. 7 lines 21 – 45);

determining a control limit for said at least one statistical quantity (fig. 2A element 40); and

comparing said at least one statistical quantity to said control limit (col. 7 lines 47 – 49).

6. Angell et al. lack:

applying a first weighting factor to a first one of said plurality of data variables and a second weighting factor to a second one of said plurality of data variables during said principal components analysis; and

wherein the first weighting factor is based on a first relative importance of the first one of said plurality of data variables, the second weighting factor is based on a second relative importance of the second one of said plurality of data variables, and the first relative importance is different from the second relative importance.

7. However, Odagiri et al. teach:

applying a first weighting factor to a first one of a plurality of data variables and a second weighting factor to a second one of said plurality of data variables during a principal components analysis (paragraph 143); and

wherein the first weighting factor is based on a first relative importance of the first one of said plurality of data variables, the second weighting factor is based on a second relative importance of the second one of said plurality of data variables, and the first relative importance is different from the second relative importance (paragraph 143) for the benefit of removing noise (paragraphs 144, 145).

8. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Odagiri et al. into the Angell et al. reference for the benefit of removing noise.

9. Angell et al. further teach:

(claim 2) wherein a process fault has occurred when said at least one statistical quantity exceeds said control limit (col. 7 lines 48 – 50, fig. 3);

(claim 3) wherein said data comprises at least one of a capacitor position, a forward radio frequency (RF) power, a reflected RF power, a voltage, a current, a phase, an impedance, a RF peak-to-peak voltage, a RF self-induced direct current bias,

Art Unit: 2891

a chamber pressure, a gas flow rate, a temperature, a backside gas pressure, a backside gas flow rate, an electrostatic clamp voltage, an electrostatic clamp current, a focus ring thickness, RF hours, a process step duration, focus ring RF hours, an optical emission spectrum, and RF harmonics (col. 7 lines 51 – 56);

(claim 4) wherein said data comprises at least one of an instantaneous value, a time average, a standard deviation, a third moment, a fourth moment, and a variance (col. 7 lines 15 – 20);

(claim 6) wherein said determining at least one statistical quantity further comprises a back-projection (fig. 2B element between 70 and 80) of said one or more scores with said one or more principal components to determine one or more residual errors (col. 7 lines 27 – 40);

(claim 7) wherein said back-projection of said one or more scores with said one or more principal components comprises matrix multiplication (col. 7 lines 5 – 40);

(claim 8) wherein said projection of said additional data onto said one or more principal components comprise matrix multiplication (col. 7 lines 5 – 26); and

(claim 12) further comprises, accessing at least one of said data, said additional data, said at least one statistical quantity, and said control limit via at least one of an intranet, and an internet ((fig. 1).

10. Angell et al. lack (claim 10) wherein at least one of said first weighting factor and said second weighting factor is determined from at least one of a data standard deviation (So), a desired standard deviation of said data variable (Sd), a relative importance of said variable (f), and a data resolution (R).

Art Unit: 2891

11. However, Odagiri et al. teach (claim 10) wherein at least one of a first weighting factor and a second weighting factor being determined from at least one of a data standard deviation (So), a desired standard deviation of said data variable (Sd), a relative importance of said variable (f), and a data resolution (R) (paragraph 141 – 150) for the benefit of for the benefit of removing noise (paragraphs 144, 145). The diagonal W_i is inherently a function of the Standard Deviation (See for example Levanon US 6,369,754, col. 11 lines 44 – 63).

12. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Odagiri et al. into the Angell et al. reference for the benefit of removing noise.

13. Angell et al. lack (claim 11) wherein said weighting at least one of said plurality of data variables, comprises applying a group scaling method.

14. However, Odagiri et al. teach (claim 11), wherein weighting at least one of a plurality of data variables, comprises applying a group scaling method (paragraphs 141 – 150) for the benefit of for the benefit of removing noise (paragraphs 144, 145). (for example in col. 11 equation 4, W_1 scales the group $U_{11} - U_{N1}$ and W_{36} scales the group $U_{1,36} - U_{N,36}$ inherent from matrix multiplication.

15. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Odagiri et al. into the Angell et al. reference for the benefit of removing noise.

Art Unit: 2891

16. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Angell et al. (US 5,658,423) in view of Odagiri et al. (US 2002/ 0067493) in view of Le et al. US 6,153,115).

17. The Angell/Odagiri et al. references teach the features previously outlined, but lack wherein said statistical quantity comprises at least one of a distance to model parameter (DModX), and a Hotelling T2 parameter.

18. However, Le et al. teach a method of determining at least one statistical quantity comprising at least one of a distance to model parameter (DModX), and a Hotelling T2 parameter from one or more scores calculated from a projection of new data onto one or more principal components of old data (figs. 5 - 10) for the benefit of increasing the Hotelling/Standard Deviation ratio, thereby increasing accuracy.

19. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Le et al. into the Angell et al. reference for the benefit of increasing accuracy in determining a change.

Response to Arguments

20. Applicant's arguments with respect to claims filed on April 2, 2009 have been considered but are moot in view of the new ground(s) of rejection. There is no evidence in the claims, that the principal components weighted according to the order of data importance, are the same principal components on which additionally acquired data are projected on.

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to IGWE U. ANYA whose telephone number is (571)272-1887. The examiner can normally be reached on M - F 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kiesha L. Rose can be reached on (571) 272-1844. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2891

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Igwe U. Anya
Examiner, Art Unit 2891

July 18, 2009

/Kiesha L. Rose/
Supervisory Patent Examiner, Art Unit 2891